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NIST HANDBOOK 150-9 CHECKLIST WOOD-BASED PRODUCTS

Instructions to the Assessor: This checklist addresses specific accreditation requirements prescribed in NIST Handbook 150-9, Wood-Based Products. The Test Method Review Summary, which is used to review the laboratory's ability to perform Wood-Based Products test methods, is to be used in conjunction with this checklist.

Place an "X" beside any of the following items that represent a nonconformity. Place a "C" beside each item on which you are commenting for other reasons. Record the item number and your nonconformity explanation and/or comments on the appropriate comment sheet(s). Place a check beside all other items you observed or verified at the laboratory.

Note: The numbering of the checklist items correlates to the numbering scheme in NIST Handbook 150-9, clauses 3, 4, and 5.

3 Accreditation process

3.3 On-site assessment

- ☐ 3.3.3 All laboratory equipment required to perform accredited testing shall be available for assessment and in good working order. The laboratory shall be prepared to demonstrate selected test methods as requested by the assessor.
- ☐ 3.3.4 The laboratory shall make available all supporting technical information in a format that is conducive to a detailed review.
- ☐ 3.3.6 The laboratory shall resolve or formulate a plan to resolve all nonconformities and provide a response to NVLAP within 30 days from the date of the on-site assessment.
- ☐ 3.3.7 The laboratory shall review all comments for potential improvements in wood-based products testing.

4 Management requirements for accreditation

4.2 Management system

- ☐ 4.2.1 If the laboratory uses a computer-based documentation system, the laboratory should consider ease of usability by the staff. The laboratory shall ensure that the requirements of NIST Handbook 150 are met so that staff are knowledgeable of the online documentation system and can, if authorized, readily retrieve needed information.
- ☐ 4.2.2 The laboratory shall have readily available the latest published version of all of the test methods for which accreditation has been requested.

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- _____ 4.2.3 If a customer, for whatever reason (e.g., regulatory requirement), requires accreditation to previous versions of a test method, then the laboratory shall document that requirement and shall have readily available the required version of the test method.
- _____ 4.2.4 When a test method references another test method, guide, practice, or specification, the laboratory shall have readily available the referenced documents, where relevant.
- 4.2.5 In addition to the information specified in NIST Handbook 150, the quality manual and/or supporting management system documentation shall include:
- _____ a) testing facilities and scope of services offered;
- _____ b) policy and procedures for use of subcontractors, if applicable;
- _____ c) procedures and actions concerning damaged or altered test materials and specimens;
- _____ d) the range (e.g., size, shape, density, and property level) of test specimens that a laboratory can test for each test method for which accreditation is sought;
- _____ e) procedures for maintenance and calibration of the equipment used in conducting the tests on wood and wood-based products (see 5.6.2).
- 4.6 Purchasing services and supplies**
- _____ The laboratory shall evaluate vendors and verify or test incoming equipment, materials, and supplies that affect the quality and accuracy of the test results.
- 4.13 Control of records**
- _____ 4.13.1 All records (test/calibration/verification, etc.; hardcopy and electronic) shall include the identity of the personnel responsible for the sampling, preparation, calibration, testing, and checking of results, and where appropriate, the associated date.
- 4.13.2
- _____ a) Records for each test, including calibration of test equipment, shall contain sufficient information to permit the same or another laboratory to reproduce the test plan in a manner that would make it possible to obtain comparable test results.
- _____ b) These records shall be kept for a period of at least three years following the issuance of a test report, unless a longer period is required by the customer, regulation, or the laboratory's own procedures.

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4.14 Internal audits

- _____ 4.14.1 The internal audit shall cover compliance with NVLAP, laboratory management system, regulatory, contractual, and testing requirements.
- _____ 4.14.2 An applicant laboratory shall conduct at least one complete internal audit prior to the first on-site assessment.
- _____ 4.14.3 For accredited laboratories, internal audit reports conducted since the previous on-site assessment shall be made available for review.

4.15 Management reviews

- _____ 4.15.1 Periodic reviews of the management system shall reflect adherence to NVLAP requirements and the laboratory's quality objectives.
- _____ 4.15.2 Management reviews shall review all nonconformities and may reflect positive aspects of the management system.
- _____ 4.15.3 An applicant laboratory shall perform at least one complete management review prior to the first on-site assessment.
- _____ 4.15.4 The report of the management review shall be available during the NVLAP on-site assessment.

5 Technical requirements for accreditation

5.2 Personnel

- _____ 5.2.1 The laboratory shall maintain a list of personnel designated to fulfill NVLAP requirements including: Laboratory Director, Technical Director, Team Leaders, NVLAP Authorized Representative, NVLAP Approved Signatories, and the staff responsible for conducting the testing.
- _____ 5.2.2 The laboratory's Technical Director (or an appropriate supervisor) shall be experienced in wood-based products testing and shall have the technical competence and the supervisory capability to direct the work of professionals and technicians in wood-based products testing.
- _____ 5.2.3 When key personnel (see 3.3.5 b) of NIST Handbook 150-9) are added to or removed from the staff, the notification to NVLAP of the personnel changes shall include a current résumé for each new staff member.
- _____ 5.2.4
- _____ a) Laboratories shall document the required qualifications for each staff position, including a résumé of qualifications; laboratory testing procedures to which the person is assigned and authorized to perform; and the results of periodic testing performance reviews.

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- _____ b) The laboratory shall evaluate the competency of each staff member for each test method the staff member is authorized to conduct.

Personnel competency for wood-based products testing includes applicable portions of the following, as a minimum:

- _____ i) general requirements of the test methods;
- _____ ii) specimen preparation, dimensional measurements, mounting techniques;
- _____ iii) operation, maintenance, and calibration of environmental control apparatus;
- _____ iv) procedures for environmental conditioning of specimens;
- _____ v) operation and calibration of test machines;
- _____ vi) determination of moisture content and specific gravity;
- _____ vii) calibration and reading of load/deformation/strain-recording equipment;
- _____ viii) operation and calibration of dimensional measuring devices;
- _____ ix) automatic data logging and readout instrumentation;
- _____ x) operation and calibration of fire performance test equipment;
- _____ xi) thermocouple mounting and calibration;
- _____ xii) characteristics of adhesives used to bond specimens;
- _____ xiii) description of specimen and test setup;
- _____ xiv) operation and calibration of balances and scales for mass determination;
- _____ xv) load application—continuous and at proper rate;
- _____ xvi) description of progression of failure and failure mode;
- _____ xvii) reading of percentage of wood failure;
- _____ xviii) operation and calibration of spectrophotometer (formaldehyde analysis);
- _____ xix) operation and calibration of spectrophotometer (treated-wood analysis);
- _____ xx) operation and calibration of large chamber (formaldehyde).

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- _____ c) For each staff member, the staff member's immediate supervisor, or a designee appointed by the Laboratory Director, shall conduct annually an assessment and an observation of performance. These annual performance reviews shall be documented, dated, signed by the supervisor and the employee, retained in the personnel file and be available for review by the assessor.
- _____ 5.2.5 The laboratory shall have a description of its training program for ensuring that staff is able to perform tests properly. The training program shall be updated and current staff members shall be given additional training when test methods are updated or procedures change, or when the individuals are assigned new responsibilities. Each staff member may receive training for assigned duties either through on-the-job training, formal classroom study, attendance at conferences, or another appropriate mechanism. The laboratory shall ensure that each new staff member is trained for the testing duties assigned.
- _____ 5.2.6 Training materials that are maintained within the laboratory shall be kept up-to-date, including applicable versions of standard test methods, as well as appropriate reference documents, texts, and scientific and industry periodicals. These materials shall be readily available to the laboratory staff.
- _____ 5.2.7 The laboratory shall ensure all individuals performing testing activities satisfy all NVLAP requirements, irrespective of the means by which individuals are compensated (e.g., the laboratory must ensure all test personnel receive proper training and supervision and are subject to annual performance reviews, etc.).
- 5.3 Accommodation and environmental conditions**
- _____ The laboratory workspace and environmentally controlled spaces (e.g., constant temperature-relative humidity rooms or cabinets) shall be checked for the required conditions. Monitoring and control devices shall be calibrated and functioning properly so as to maintain and record the required environmental conditions.

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5.4 Test and calibration methods and method validation

5.4.1 Standard test methods

- _____ 5.4.1.1 The management system documentation shall contain or make reference to detailed written instructions of the procedures, practices, instructions and equipment that the laboratory uses in conducting the test methods for which it seeks or holds accreditation. These detailed instructions, including those for equipment operation, calibration checks, and quality control checks, shall address any laboratory-specific information not contained in the standard method. When necessary, the test method shall be supplemented with additional detailed instructions beyond the test method to ensure consistent application.
- _____ 5.4.1.2 A laboratory may be accredited to perform standard test methods in their entirety or to perform only specific sections in the test method. Accreditation restrictions to specific sections of the test method shall be stated on the laboratory's scope of accreditation.

5.4.2 Off-site testing

- _____ 5.4.2.2 The laboratory shall provide a step-by-step procedure for personnel to follow when performing off-site testing.
- _____ 5.4.2.3 The laboratory shall maintain records of its off-site testing.
- _____ 5.4.2.4 If a laboratory selects off-site testing methods to be included in its scope of accreditation, it shall provide to the NVLAP assessor the following:
- _____ a) complete step-by-step procedure for personnel to follow when performing the standard off-site test;
 - _____ b) demonstration of the test procedure;
 - _____ c) folder or file containing raw data from off-site tests;
 - _____ d) test reports and test data sheets;
 - _____ e) demonstration of compliance with NVLAP calibration and traceability requirements;
 - _____ f) evidence that adequate supervision during the off-site testing is provided by a qualified staff member of the accredited laboratory.

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5.4.3 Additional requirements

5.4.3.1 Mechanical and physical properties

The following requirements relate to test methods and the conduct of tests, including mechanical and physical properties:

- _____ a) Samples are properly prepared, environmentally conditioned (including proper moisture content), handled, and maintained before testing.
- _____ b) Measurements of specimen dimensions and mass are accurately determined; descriptions of important sample characteristics are recorded when required.
- _____ c) Test(s) are conducted within the specified temperature, humidity, and/or air flow conditions.
- _____ d) Wood and wood-based products are tested in the specified orientation, if any, and with proper test setup.
- _____ e) For mechanical testing, proper rate of load, strain, or deformation is applied to specimen.
- _____ f) For the physical and mechanical measurements, test reports adequately describe the procedures and equipment, and where appropriate, failure mode and characteristics.

5.4.3.2 Formaldehyde tests

5.4.3.2.1 The laboratory:

- _____ a) maintains and verifies low levels of formaldehyde in storage and test areas;
- _____ b) monitors temperature and relative humidity, as required during conditioning and testing of the wood-based specimens;
- _____ c) has a chamber(s) that is properly constructed, calibrated, and maintained for conducting formaldehyde-emission tests;
- _____ d) has a desiccator(s) of adequate size for conducting formaldehyde-emission tests;
- _____ e) has perforator apparatus with all the necessary components for conducting formaldehyde-emission tests;
- _____ f) seals desiccators with vacuum grease;
- _____ g) has necessary spectrophotometers, glassware, reagents, and other related apparatus for conducting formaldehyde analyses.

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5.4.3.2.2 Test specimens have:

- ___ a) the specified dimensions;
- ___ b) proper edge-coating with paraffin wax where required.

5.4.3.2.3 The laboratory:

- ___ a) conditions and exposes specimens for the required length of time;
- ___ b) dries specimens to constant mass before formaldehyde-emission tests are conducted, where required;
- ___ c) places specimens in chambers or desiccators such that all surfaces are freely exposed;
- ___ d) cleans glassware using specified cleaning solutions;
- ___ e) uses analytical grade reagents, as specified;
- ___ f) uses freshly prepared standard formaldehyde solutions;
- ___ g) adds sulfuric acid to analysis solutions such that splattering does not occur;
- ___ h) standardizes the spectrophotometer at the appropriate wavelength (i.e., 412 nm or 580 nm);
- ___ i) prepares formaldehyde concentration-UV absorbance calibration curves according to the procedure given in specified test method;
- ___ j) assures that formaldehyde determinations on phenol-formaldehyde products have no interference from phenol; and
- ___ k) conducts additional formaldehyde determinations when replicate analyses differ by more than the specified allowable limits.

5.4.3.3 Analysis of treated wood products

5.4.3.3.1 Where required by the test method, the laboratory has:

- ___ a) apparatus with all the necessary components for specimen extraction;
- ___ b) equipment with all the necessary components for specimen ignition;
- ___ c) the necessary equipment for preparing pellets for XRF analysis;
- ___ d) a properly calibrated spectrophotometer (atomic absorptions or XRF) for conducting the analysis.

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5.4.3.3.2 The laboratory:

- ___ a) uses a vented oven for drying specimens, when specified;
- ___ b) uses a microwave oven for drying samples, only if it has established that error is not introduced into the analysis due to the microwave drying;
- ___ c) has necessary glassware, reagents, and other related apparatus for conducting the analyses.

5.4.3.3.3 Test specimens are:

- ___ a) dried as required and, upon drying, are handled such that they do not pick up moisture before testing;
- ___ b) prepared to have the proper mass, volume, size, shape, density, or concentration as specified in the individual test method.

5.4.3.3.4 The laboratory:

- ___ a) performs the analytical methods correctly, and applies them to specimens that have the elements or constituents under analysis within the concentration range specified in the standard;
- ___ b) only conducts chloride determinations (AWPA A5) on samples that contain no halogens other than chlorine unless appropriate correction is properly made;
- ___ c) assures that standard solutions used for wet chemical and instrumental analyses are prepared to the required concentrations;
- ___ d) assures the correct concentration of standardized solutions and checks that they have not changed in concentration before use;
- ___ e) prepares calibration curves for spectrophotometric analyses (atomic absorption or XRF) according to the procedure given in specified test method;
- ___ f) verifies that calibration curves for spectrophotometric analyses have not changed during the analyses;
- ___ g) has procedures to assure that, when conducting spectrophotometric tests, interferences are not affecting the analytical results;
- ___ h) cleans and assembles glassware (e.g., extraction apparatus) as required;
- ___ i) uses reagent grade chemicals and reagent purity or deionized water, as specified;
- ___ j) uses high purity gases, and proper flame conditions and light sources when conducting atomic absorption spectrophotometry;

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- _____ k) conducts extraction or ignition procedures correctly using specified times and temperatures, when performing tests incorporating these procedures;
- _____ l) detects end-points properly when performing titrations.

5.4.4 Estimation of uncertainty of measurement

- _____ At a minimum, the management system documentation shall list the important variables that substantially affect the uncertainty of the test results. This can be done for groups of similar test methods (e.g., grouped by mechanical, physical, or electrical properties) rather than for each test method. The uncertainty shall be determined and reported if required by the test method or the customer.

5.6 Measurement traceability

- _____ 5.6.2 To account for the effects on traceability of the calibration of measurement and test equipment (M & TE), the laboratory shall determine calibration, verification, and maintenance intervals based on the equipment's frequency of use and the environment in which it is used, and also in accordance with standard test methods, manufacturer's recommendations, or as specified in the following table, whichever results in shorter time periods between calibrations. Extension of the time interval between calibrations is acceptable if the laboratory can provide justification for increasing the interval.

Apparatus/Instrumentation

Calibration or Verification Frequency

dimensional measuring devices	annually
drying ovens	annually
tensile/compression test machines and load cells	annually
scales and balances	annually
large chamber (formaldehyde)	annually
automatic data logging and readout	annually*
ammeters, ohmmeters, voltmeters, wattmeters*	annually*
potentiometers	annually*
temperature sensors and related instrumentation	annually*
thermostats	annually*
environmental conditioning units	quarterly
humidity cabinets	quarterly

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calorimeters	per test method
gas analyzers	per test method
photometers	per test method
smoke obscuration measuring system	per test method
transducers and dial gages	per test method
spectrophotometer	per test method

* If the calibration of the equipment is shown to vary due to the lack of modern solid-state electronics, then the entry under **Frequency** shall be 6 months.

- _____ 5.6.3 Proper performance of the testing equipment shall be periodically verified as needed.
- _____ 5.6.4 The reference standards used and the environmental conditions at the time of calibration shall be documented for all calibrations.
- 5.6.5
- _____ a) Certificates are required for calibrations performed by outside services. A calibration certificate shall indicate uncertainty or accuracy tolerance limits, and traceability of reference standards.
- _____ b) If the testing laboratory performs its own calibration, the standard metrological procedures used, the environmental conditions, and the measurement uncertainty shall be documented. For such calibrations, the testing laboratory shall have properly trained personnel who understand the importance of the various factors that affect the uncertainty of the calibration and its effect on the uncertainty of the final test result (see NIST Handbook 150, 5.4.6).
- 5.6.6 In addition to the information specified in NIST Handbook 150, 5.5.5, calibration or verification records shall include the following:
- _____ a) a list of all equipment variables requiring calibration, traceability, or verification;
- _____ b) range of calibration/traceability/verification;
- _____ c) resolution (precision or the number of digits read) of the instrument and its allowable error (i.e., tolerance);
- _____ d) periodic verification dates and schedule;
- _____ e) identity of the laboratory individual/group or external service responsible for calibration;
- _____ f) identity and source of reference standard and traceability.

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5.7 Sampling

_____ Appropriate sampling plans shall be included in the management system when they are required by the test method or when the laboratory is required to sample.

5.10 Reporting the results

_____ Where appropriate, test reports shall clearly state that the test results apply to the product or system as tested and, if required, conform to regulator requirements.

